

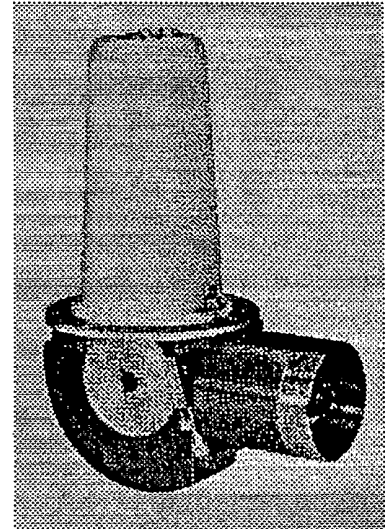


NATIONAL

JAN 5586

Pulse Magnetron

The National JAN5586 Magnetron is an unpackaged, pulse Magnetron tunable from 2700 MHz to 2900 MHz with a peak power output of 800 kilowatts. The output is in a 1-5/8" coaxial transmission line.



GENERAL CHARACTERISTICS

MECHANICAL

Mounting Position	any
Dimensions	see outline drawing
Weight	
Net	5.5 lbs.
Shipping	10.5 lbs.
Required Magnetic Field ⁽¹⁾	2700 gauss
Magnetic Gap ⁽¹⁾	1.8 inches
Location of North Seeking Pole ⁽¹⁾	adjacent to the cathode (non-tuner) side of the magnetron
Output Coupling ⁽²⁾	1-5/8" coaxial transmission line
Input Coupling ⁽²⁾	banana jacks
Tuner Drive Mechanism ⁽²⁾	
Type	spline drive to worm and gear
Cooling	
Type	forced air
Maximum Temperature	
Anode	100°C max.
Accessories	none

ELECTRICAL

Heater Voltage (standby)	16.0 ± 10% volts
Heater Current (standby)	3.1 ± 10% amps
Heater Minimum Pre-Heat Time	120 seconds, min.
Heater Surge Current	12 amps max.
Power Output (peak) (at 70 amps)	800 kilowatts min.
Frequency Range	2700-2900 MHz
Pulling Factor	15 MHz max.
Temperature Coefficient (freq.)	.07 MHz/°C max.

NATIONAL ELECTRONICS

A Division of Richardson Electronics, Ltd.
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GENERAL CHARACTERISTICS (Continued)

ABSOLUTE RATINGS

Heater Volts	17.6 Volts max.
Heater Current	3.4 Amps max.
Anode Volts	32 kv max.
Anode Current (peak)	70 amps max.
Input Power (average)	1200 Watts max.
Input Power (peak)	2100 kw max.
Pulse Duration	2.5 microseconds max. 0.5 microseconds min.
Rate of Rise of Voltage Pulse ⁽³⁾	150 kv/ μ s max. 75 kv/ μ s min.
Pulse Repetition Rate	3000 pps max.
Duty Factor	.001 max.
Load VSWR	1.5:1 max.
Ambient Pressure Pressurization	10.1 psia min. (10,000 ft.)
Output	45 psia max.
Input	45 psia max.
Storage Temperatures	85°C max. -55°C max.

TYPICAL OPERATION

Heater Voltage ⁽⁴⁾	9.0	8.0	Volts dc
Peak Anode Current	70	40	amps
Peak Anode Voltage	28	23.5	kv
Magnetic Field ⁽⁵⁾	2700	2700	gauss
Load VSWR	1.15:1	1.15:1	
Average Anode Current	35	40	mA
Duty Factor	.0005	.001	
Pulse Repetition Frequency	500	1200	pps
Pulse Duration	1.0	0.833	μ s.
Rate of Rise of Voltage Pulse ⁽³⁾	140	140	kv/ μ s.
Average Power Output	450	550	Watts
Peak Power Output	900	550	kw
Frequency	2800	2800	MHz
Spectrum			
Side Lobe Ratio	7	7	db
Bandwidth at 6 db Points	< 2.0	< 2.5	MHz

OPERATING NOTES

A new tube, or one that has not been operated for several months, should be "aged". This consists of applying a reduced pulsed voltage to the tube and increasing it to a point where arcing begins or where full input conditions are obtained. If arcing occurs before full input conditions, maintain the pulsed voltage at this level until the tube operation is stable. The pulsed voltage is then increased until arcing again begins. This process is continued until stable operation is obtained at full input conditions.

If serious malfunction of the tube occurs, the pulsed voltage should be removed immediately to prevent permanent damage to the equipment or the tube. After checking the circuit components and connections, the procedure for aging a new tube should be followed when again applying pulsed voltage to the tube.

3) Measured as the slope of the steepest tangent above the 50% point on the pulse.

4) See Operating Notes for heater voltage cut-back schedule.

5) See Operating Notes for method of calibrating the magnetic field.

GENERAL CHARACTERISTICS (Continued)

OPERATING NOTES (Continued)

Proper operation of the magnetron depends upon a magnetic field of the correct strength and orientation. The normal field strength required for the 5586 is 2700 gauss. However, there are some applications where a weaker field is used. To determine the required magnetic field strength consult the instruction manual for the equipment.

The attached drawing indicates the correct pole piece geometry for the 5586 and the correct method for determining the field strength of the magnet. If the magnetic field strength is more than 100 gauss below the required value, inferior magnetron operation will result. The magnet should be remagnetized as soon as possible.

To prevent accidental demagnetization of the magnet, non-magnetic tools must be used when working in the vicinity of the magnet.

NOTE

Watches can be damaged by the strong magnetic field of the magnet. They should be removed when the installation procedure is performed.

The magnetic field should be calibrated in accordance with the following procedure:

- a. With a conventional 1/8 inch pole piece attached to the pole face of the magnet adjacent to the non-tuner side of the magnetron as per figure (a), the magnetic gap should be 1.800 inches.
- b. The magnetic field should then be adjusted for 2700 gauss at the center of the gap.
- c. Remove the conventional 1/8 inch pole piece and replace it with the distortion pole piece shown in figure (b).

Prior to the application of high voltage, the cathode should be heated to the required initial operating temperature. This is done by applying $16.0 \pm 10\%$ volts for two minutes. On the application of anode voltage, the heater voltage should be reduced according to the following schedule:

<u>P_i (watts)</u>	<u>E_f (volts)</u>
1000-1200	8.0
800-1000	10.5
600-800	13.0
400-600	15.0
Less than-400	16.0

INSTALLATION INSTRUCTIONS

The tube should be examined to determine that it has not been damaged during shipping and that the input and output connectors have not become corroded due to improper storage.

The Amperex 5586 magnetron is normally tuned to the upper frequency limit when it is shipped (2900 MHz). Counter-clockwise rotation of the large tuning gear will reduce the magnetron frequency. About four turns of the tuning gear cover the 200 MHz tuning range of these tubes. Care must be exercised at either end of the tuning range to ensure that this tuner is not forced beyond the stop since permanent damage to the tube will result.

If it is necessary to move the tuning worm in order to install the tube, tune the tube through one full turn of the tuning gear before installing the tube. This will ensure that there is no interference between the tuning gear and the worm gear.

GENERAL CHARACTERISTICS (Continued)

INSTALLATION INSTRUCTIONS (Continued)

All connections to the magnetron should be clean and free from corrosion. Special attention should be given to the "bullet" which connects to the inner conductor of the output of the tube. It should be thoroughly cleaned and carefully inserted. Make sure that a positive contact is made at the tube and at the adaptor to which the tube is connected.

Sufficient forced air should be available to prevent the anode temperature from exceeding 100°C during the operation.

Install the tube into the equipment using the following procedure:

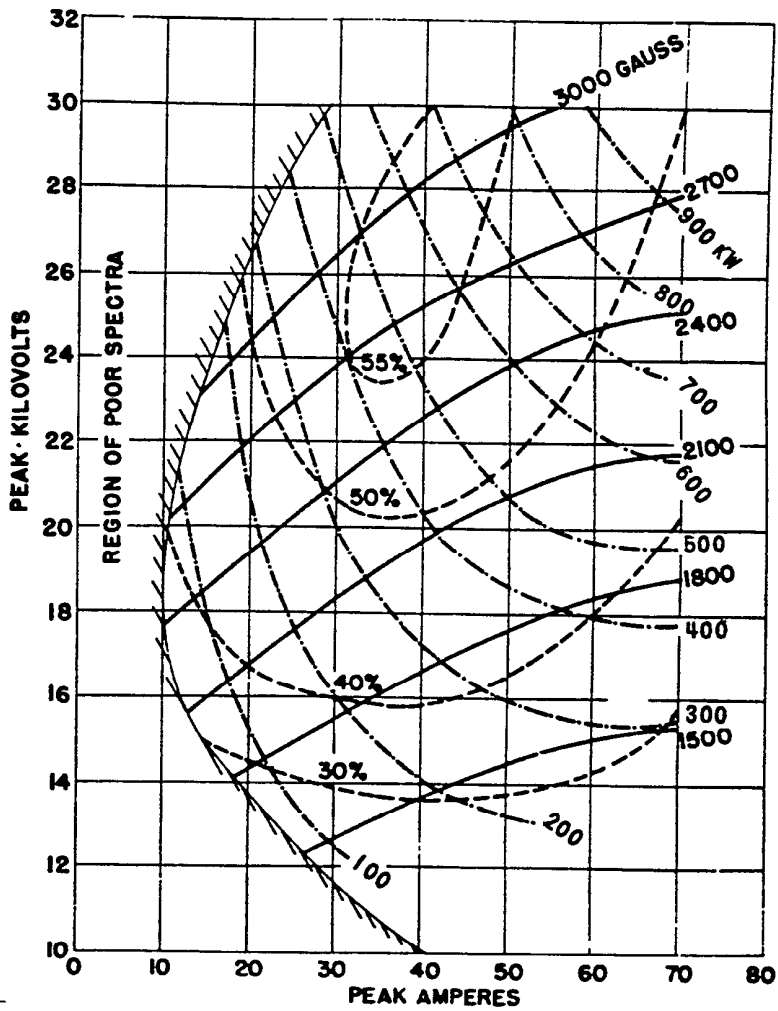
- a. Carefully insert the "bullet" into the inner conductor of the output of the tube. (See Equipment Step 1)
- b. Insert the tube in the output transition and tighten the clamp ring. This will protect the output glass from any stress involved in bolting the magnetron to the equipment. If it is necessary to loosen the clamp ring in order to adjust the position of the magnetron in the transition, all stress should be removed from the joint until the clamp ring is again tightened.
- c. The anode should be centrally located in the magnet air gap with the flat side of the anode parallel to the pole face of the magnet. The anode should also be axial with the magnet pole faces. The cathode side (non-tuner side) of the magnetron anode should be adjacent to the north pole of the magnet.
- d. Connect the equipment cathode lead (the lead which carries the magnetron current) to the terminal marked with a "C" on the protective boot.
- e. Apply the recommended stand-by voltage to the magnetron heater for at least 120 seconds.

NOTE

If it is necessary to install a tube that has been stored at a low ambient temperature before it has reached room temperature, sufficient pre-heat time must be allowed to ensure that moisture is not entrapped in the boot which protects the magnetron input. Entrapped moisture could lead to severe arcing, which could destroy the tube.

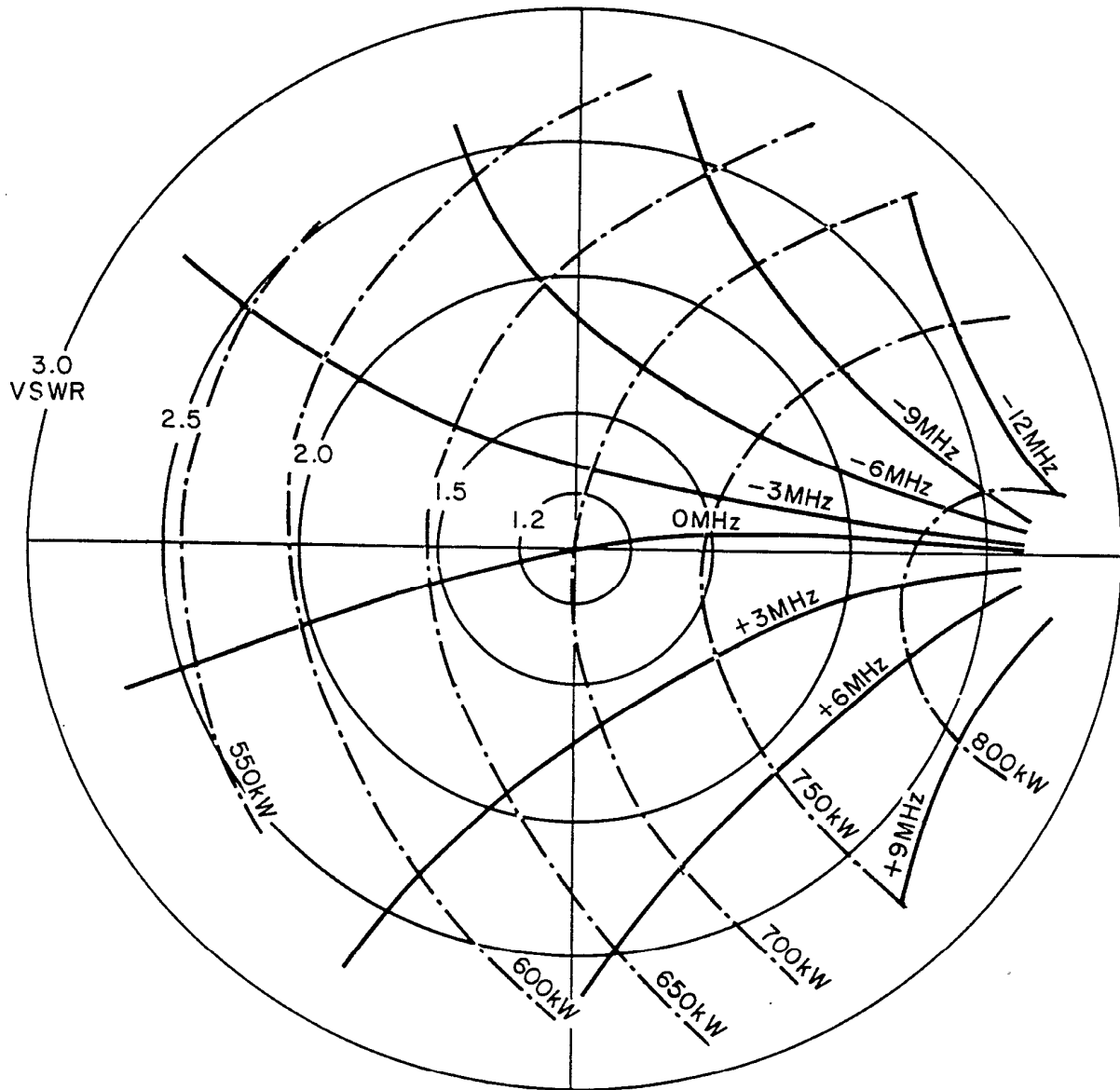
- f. Apply the high voltage and observe the recommended heater voltage cutback schedule.

5586 PERFORMANCE CHART

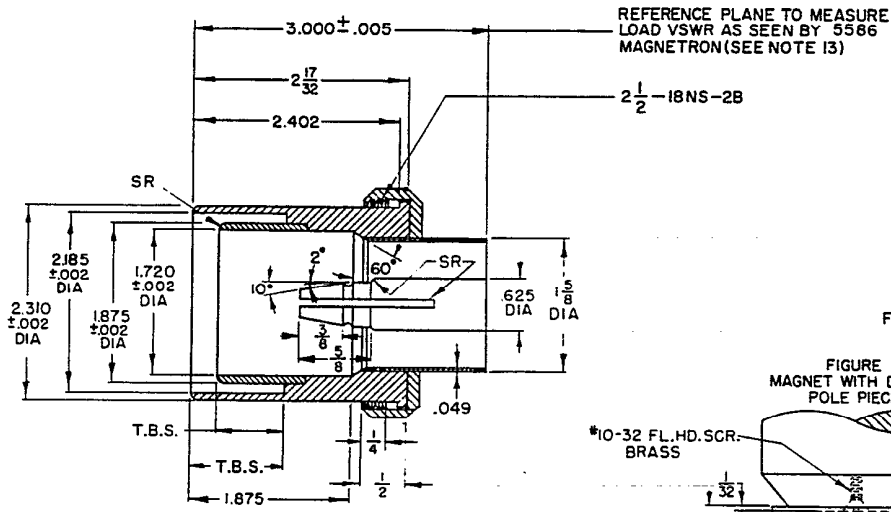


PULLING FIGURE = 13 MHz
 FREQUENCY = 2800 MHz

RIEKE DIAGRAM

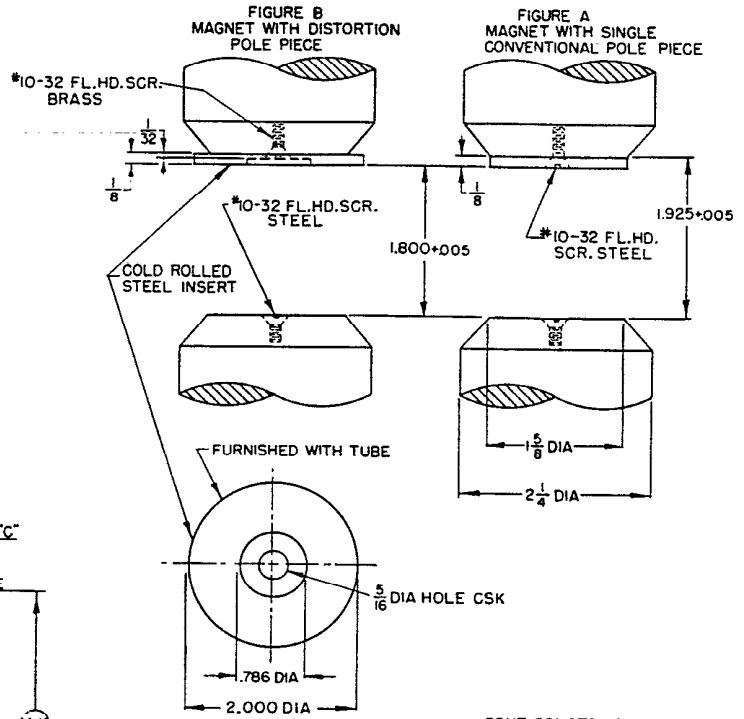


PEAK CURRENT = 50 AMPERES
MAGNETIC FIELD = 2700 GAUSS
FREQUENCY OF 0 MHz/SEC CONTOUR
= 2800 MHz

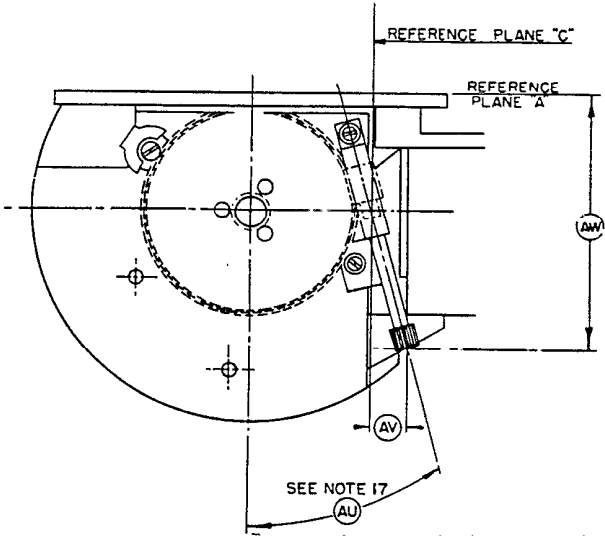


TEST COUPLING NOT FURNISHED WITH TUBE SHOWN FOR INFORMATION ONLY

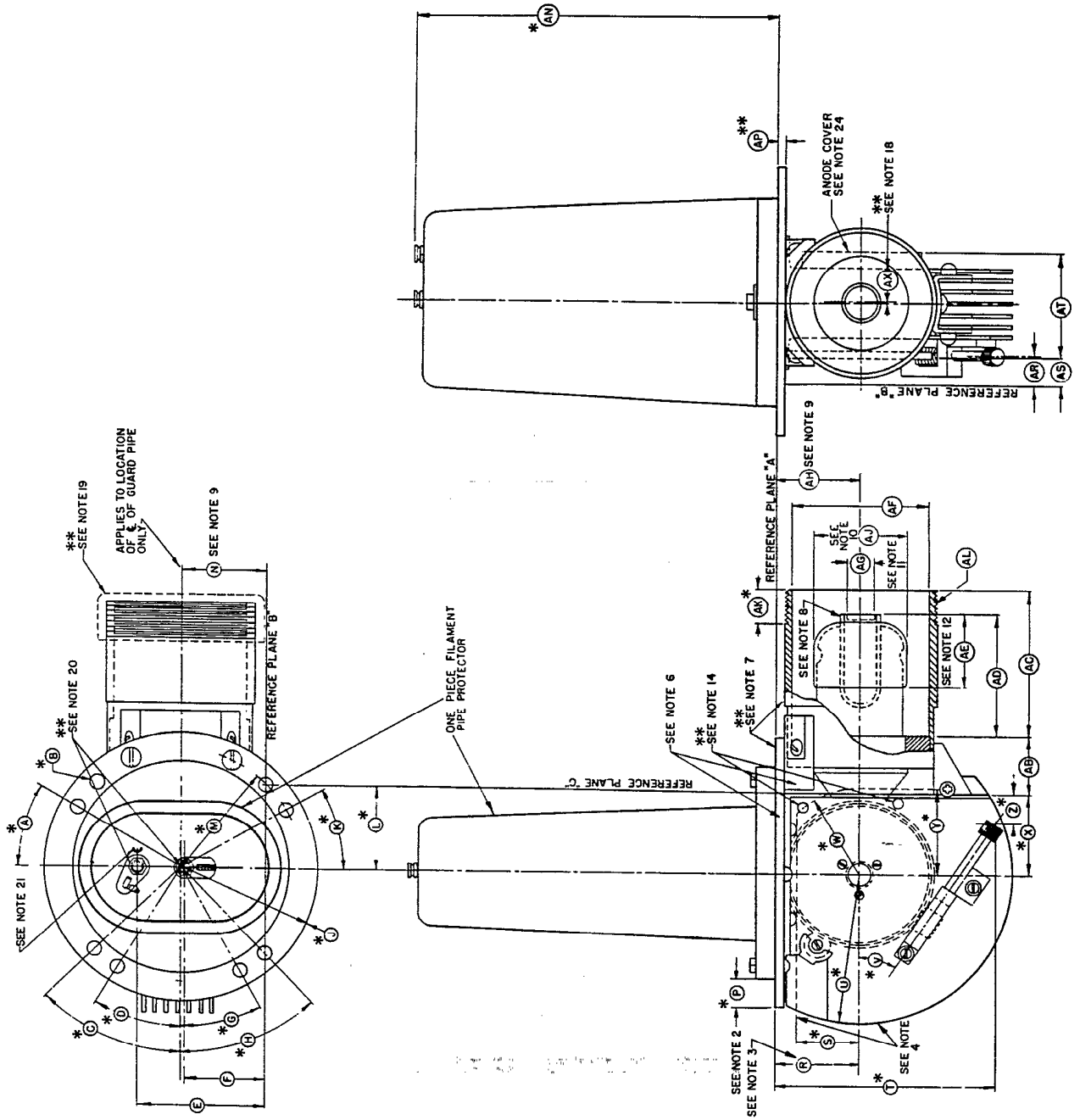
MAGNETIC FIELD CALIBRATORS FOR ELECTRON TUBE TYPE 5586



CONE CONSTRUCTION IS OPTIONAL



OPTIONAL LOCATION OF TUNING SPLINE (SEE NOTE 14)



REF	DIMENSIONS		
	NOM	MIN	MAX
*A	29' 48"	30' 12"	
*B	205 DIA	215 DIA	8 HOLES
*C	44' 48"	43' 12"	
*D	29' 48"	30' 12"	
E	2.156		
F	1.359		
*G	29' 48"	30' 12"	
*H	44' 48"	43' 12"	
*I	2.266 R	2.296 R	
*J	29' 48"	30' 12"	
*K	1.437		
*L			
*M	2.029 R	2.035 R	
N	1.417	1.457	
*P	500		
R	1.440		
*S	3.500	1.063	
*T			
*U			
*V			
*W			
*X			
*Y	1.437	1.500 R	
*Z	.756	1.500	
*AB	.803	.833	
AC	2.287	2.307	
AD	2.060	2.110	
AE	1.125	2.328	
AF	2.314	2.328	
AG	550	560	
AH	1.420	1.460	
AJ			
AJ			
*AK		.993	
AL	2 1/4 -18 NS2A		
*AN	6.219	6.407	
*AP	.187		
AR	.438	.688	
AS	.525	.625	
AT		1.740	
AU	11° 30'	16° 30'	
AV	.313		
AW	2.612		
AX	.025		

* DESIGN TEST
 ** QUALIFICATION APPROVAL

NOTES:

1. The center of jack holes shall be within a radius of .100 of the loc. specified, but shall be spaced $.795 \pm .015$ with respect to each other.
- *2. This annular area shall be flat within .015 (A thickness gage 1/8 wide shall not enter more than 1/4).
3. The periphery of the anode shall lie within a 2.160 circle loc. as specified for non-tunable side of anode.
4. Max. width specified applies to area specified by broken line and circumference of radiator.
- **5. Paint with heat resistant, non-corrosive black paint. The following shall be free from paint; top surface of mounting plate, parts above mounting plate, screw thds. on guard pipe, and all surfaces inside guard pipe, tuning gear, stop and worm shaft assembly.
6. All solder joints on mounting plate and guard pipe shall be soldered to provide a hermetic seal.
- **7. Tube may be supported by mounting plate or guard pipe.
8. No sharp edges on outside dia. at end of inner conductor.
9. Applies to location of center line of guard pipe only.
10. Center line of max. dia. shall be concentric with center line of guard pipe to within .040.
11. Applies to inner conductor insert only, center line of inner conductor insert shall be concentric with center line of guard pipe to within .025.
12. Applies to straight portion of inner conductor wall.
13. This test coupling shall be used when testing 5586 Magnetron for electrical acceptability. The specified ref. plane shall be used when measuring the load VSWR as specified for 5586 electrical testing. If it is desired to measure VSWR characteristics of components coupled to this test coupling, use should be made of 5586 test coupling to termination adapter, DWG # S-62751-2.
- **14. Optional location of tuning spline. Tube to be supplied with spline loc. as specified by customer.
15. Tuning mechanism will provide full range of tuning with approximately 5 complete revolutions of large tuning gear.
- *16. Spline for adjusting tuning mechanism is as follows, 12 teeth 48 pitch, .250 P.D.
- **17. Clearance to adapter guard pipe must be sufficient to allow use of SS White #2666X, end fitting (13/32 DIA)
- **18. This dimension shows relation between a plane passing thru Lateral center of anode and a plane thru center of guard pipe.
- **19. Protective guard for shipping purposes.
- **20. Hex. locking head banana pit jack 19/32 lg. hole $.169 \pm .005$ per mil-e-1
- **21. Common cathode connection marked with letter "C"
22. Ref. plane "A" is defined as a plane passing along the face of the mounting plate.
Ref. plane "B" is defined as a plane perpendicular to plane "A" and passing thru. center of the holes as shown.
Ref. plane "C" is defined as a plane mutually perpendicular to planes A & B and passing thru the center of the hole as shown.
23. Nominal Dim. are for information purposes only and shall not be checked for acceptance inspection.
24. Temperature to be checked at this point; max. temperature reading to be 100° C max.